Assessment of Adsorption Properties of Neem Leaves Wastes for the Removal of Congo Red and Methyl Orange

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Abstract : Neem leaves were studied as plant wastes derived adsorbents for detoxification of Congo Red (CR) and Methyl Orange (MO) from aqueous solutions using batch adsorption technique. The objectives involved determining the effects of the basic adsorption parameters are namely, agitation time, adsorbent dosage, adsorbents particle size, adsorbate loading concentrations and initial pH, on the adsorption process as well as characterizing the adsorbents by determining their physicochemical properties, functional groups responsible for the adsorption process using Fourier Transform Infrared (FTIR) spectroscopy and surface morphology using scanning electron microscopy (SEM) coupled with energy dispersion X – ray spectroscopy (EDS). The adsorption behaviours of the materials were tested against Langmuir, Freundlich, etc. isotherm models. Percent adsorption increased with increase in agitation time (5 – 240 minutes), adsorbent dosage (100-500mg), initial concentration (100-300mg/L), and with decrease in particle size ($\geq 75\mu m$ to $\leq 300\mu m$) of the adsorbents. Both processes are dye pH-dependent, increasing or decreasing percent adsorption in acidic (2-6) or alkaline (8-12) range over the studied pH (2-12) range. From the experimental data the Langmuir's separation factor (RL) suggests unfavourable adsorption for all processes, Freundlich constant (nF) indicates unfavourable process for CR and MO adsorption; while the mean free energy of adsorption

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